CLAIMS

1. A road information provision server for providing road congestion information, comprising:

basic road network storage means for storing road

5   network information;

congestion information storage means for storing congestion information;

congestion information processing means for generating congested road network descriptions based on

10 said road network information stored in said basic road network storage means and on congestion information stored in said congestion information storage means;

congested road network description storage means for storing said congested road network descriptions

15 generated by said congestion information processing means; and,

information provision processing means for generating and providing road information for all legs of a route, based on route specification information

20 specifying said route for searching, said congested road network descriptions stored by said congested road network description storage means, and said road network

information stored by said basic road network storage means.

2. The road information provision server according to Claim 1, characterized in that said
5 information provision processing means generates, as road information, the course, distance, and time for said specified route.

3. The road information provision server according to Claim 1, characterized in that said
10 information provision processing means generates, as road information, the course, distance, and time for said specified route; searches for the shortest route, in terms of either distance or time, based on starting position information and ending position information for
15 the specified route and on said congested road network descriptions, and generates, as road information, the shortest route, in terms of either distance or of time.

4. The road information provision server according to Claim 1, characterized in that said
20 information provision processing means generates, as road information, the course, distance, and time for said specified route, and generates, as road information, a plurality of routes from said congested road network descriptions together with prediction times, based on

the starting position information and ending position information of the specified route.

5. The road information provision server according to Claim 1, characterized in that, when congestion information stored in said congestion information storage means is indicated by travel times $t(i)$ for unit routes (i), said congestion information processing means uses average velocities v for each route type to calculate the congestion distances $L(i)$ for each unit route (i) comprised by a congested road network description according to the equation

$$L(i) = v \cdot t(i) \tag{1}$$

and generates a congested road network description.

6. The road information provision server according to Claim 1, characterized in that said congestion information processing means calculates congestion distances $L(i)$ for each unit route (i) comprised by a congested road network description, based on the basic distances $L0(i)$ of each unit route (i) of said road network information stored in said basic road network storage means and on the distances x and/or y of congestion and/or slowdown in each of said unit routes (i) comprised by said congestion information stored in

said congestion information storage means, according to the equation

$$L(i) = (L0(i) - x - y) + \alpha x + \beta y \qquad (2)$$

where α is a weighting factor (>1) for congestion,

5 and β is a weighting factor (>1) for traffic slowdowns, and generates a congested road network description.

7. A road information provision system, comprising:

a terminal device for specifying routes and

10 requests road information;

a congestion information center for providing congestion information; and,

a road information provision server for generating road information based on said congestion information

15 from said congestion information center in response to a request from said terminal device, and providing said road information to said terminal device; and characterized in that

said road information provision server is the road

20 information provision server according to Claim 1.

8. The road information provision system according to Claim 7, characterized in that said

terminal device obtains current position information from a GPS (Global Positioning System), and uses said current position as the starting position of a specified route.

9. A road information provision method of providing road information for specified routes, the method comprising the steps of:

(A) the basic distance L0(i) and type of each unit route (i), as well as the average velocity v for each route type, are stored as road network information;

(B) congestion information is obtained and stored;

(C) a congested road network description is generated and stored, based on said road network information and on said congestion information;

(D) in response to a request accompanied by a route specification, the course and time for the shortest route, in terms of either distance or of time, are calculated based on the congested road network description for the specified route, the distance of said shortest route is calculated based on said road network information, and the course, distance and time of the shortest route are generated as road information; and,

(E) said generated road information is provided.

10. The road information provision method according to Claim 9, characterized in that said step (B) and said step (C) are performed with prescribed

5   timing.

11. The road information provision method according to Claim 9, characterized in that in said step (B), travel times t(i) for each unit route (i) are obtained and stored as congestion information, and that

10   in said step (C), average velocities v for each route type are used to calculate congestion distances L(i) for each unit route (i) comprised by a congested road network description according to the equation

L(i) = v•t(i)   (1)

15   and a congested road network description is generated.

12. The road information provision method according to Claim 9, characterized in that in said step (B), distances x and/or y of congestion and/or slowdown

20   in each unit route (i) are obtained and stored as congestion information, and that in said step (C), congestion distances L(i) for each unit route (i) comprised by a congested road network description are

calculated, based on basic distances L0(i) for each unit route (i) of said road network and on the distances x and/or y of congestion and/or slowdown in said unit routes (i) comprised by said congestion information,

5   according to the equation

$$L(i) = (L0(i) - x - y) + \alpha x + \beta y \qquad (2)$$

where α is a weighting factor (>1) for congestion, and β is a weighting factor (>1) for traffic slowdowns, and a congested road network description is generated.

10   13. A route search server for performing road route searches, comprising:

basic road network storage means for storing road network information;

congestion information storage means for storing

15 congestion information;

congestion information processing means for generating congested road network descriptions with prescribed timing based on said road network information stored in said basic road network storage means and on

20 congestion information stored in said congestion information storage means;

congested road network description storage means for storing the latest congested road network

description among said congested road network descriptions generated by said congestion information processing means;

5   historical congested road network description storage means for storing past congested road network descriptions among said congested road network descriptions generated by said congestion information processing means; and,

10 information provision processing means for generating route information by searching road routes from said congested road network descriptions stored by said congested road network description storage means or by said historical congested road network description storage means and from said road network information

15 stored by said basic road network storage means based on route specification information, and providing the route information; and characterized in that

said route information includes time information indicating the time of generation of the route

20 information, and, when said time information is included by said route specification information, said information provision processing means selects said congested road network description at the time indicated by said time information from said congested road

network description storage means or from said historical congested road network description storage means, and performs a road route search from the selected congested road network description and from
5 said road network information stored in said basic road network storage means.

14. The route search server according to Claim 13, characterized in that said information provision processing means generates said route information using
10 map information and text information.

15. The route search server according to Claim 13, characterized in that said information provision processing means generates, as route information, the shortest route, in terms of either distance or time,
15 from said congested road network description, based on said route specification information.

16. The route search server according to Claim 13, characterized in that, when congestion information stored in said congestion information storage means is
20 indicated by travel times t(i) for unit routes (i), said congestion information processing means uses average velocities v for each route type to calculate the congestion distances L(i) for each unit route (i)

comprised by a congested road network description according to the equation

$$L(i) = v \cdot t(i) \qquad\qquad (1)$$

and generates a congested road network description.

5   17. The route search server according to Claim 13, characterized in that said congestion information processing means calculates congestion distances L(i) for each unit route (i) comprised by a congested road network description, based on the basic distances L0(i) 10 of each unit route (i) of said road network information stored in said basic road network storage means and on the distances x and/or y of congestion and/or slowdown in each of said unit routes (i) comprised by said congestion information stored in said congestion 15 information storage means, according to the equation

$$L(i) = (L0(i) - x - y) + \alpha x + \beta y \qquad\qquad (2)$$

where α is a weighting factor (>1) for congestion, and β is a weighting factor (>1) for traffic slowdowns, and generates a congested road network description.

20   18. A route search system, comprising:

a terminal device for specifying routes and requests road information;

a congestion information center for providing congestion information; and,

a route search server for generating route information based on said congestion information from said congestion information center in response to a request from said terminal device and providing said route information to said terminal device; and characterized in that

said route search server is the route search server according to Claim 13.

19. The route search system according to Claim 18, characterized in that said terminal device obtains current position information from a GPS (Global Positioning System), and uses said current position as the starting position of a specified route.

20. A route search method of providing route information for a specified route, the method comprising the steps of:

(A) storing the basic distance $L0(i)$ and type of each unit route (i), as well as the average velocity v for each route type, as road network information;

(B) obtaining and storing congestion information with prescribed timing;

(C) generating the latest congested road network description based on said road network information and on said congestion information, with the same or different timing as step (B);

5   (D) storing currently stored congested road network descriptions as historical congested road network descriptions, and updating by said latest congested road network description;

(E) calculating the course and time based on said
10   latest congested road network description or said historical congested road network descriptions in response to a route search request, and calculating the distance of said course based on said calculated course and on said road network information, and generating the
15   course, distance and time as route information; and,

(F) adding time information indicating the time at which the route information was generated to said generated route information, and providing said route information.

20   21.   The route search method according to Claim 20, characterized in that in said step (E), when time information is comprised by a route search request, the congested road network description at the time indicated by said time information is selected from said latest

congested road network descriptions or from said historical congested road network descriptions, and route searching is performed.

22. The route search method according to Claim 20, characterized in that in said step (B), travel times $t(i)$ for each unit route (i) are obtained and stored as congestion information, and that in said step (C), average velocities for each route type are used to calculate congestion distances $L(i)$ for each unit route (i) comprised by the congested road network description according to the equation

$$L(i) = v \cdot t(i) \qquad\qquad (1)$$

and the congested road network description is generated.

23. The route search method according to Claim 20, characterized in that in said step (B), distances x and/or y of congestion and/or slowdown for each unit route (i) are obtained and stored as congestion information, and that in said step (C), congestion distances $L(i)$ are calculated for each unit route (i), based on basic distances $L0(i)$ for each unit route (i) of said road network information and on distances x and/or y of congestion and/or slowdown for said unit

routes (i) comprised by said congestion information, according to the equation

$$L(i) = (L0(i) - x - y) + \alpha x + \beta y \qquad (2)$$

where α is a weighting factor (>1) for congestion, and β is a weighting factor (>1) for traffic slowdowns, and a congested road network description is generated.